

Remarks:

Reconsideration of the application is requested. Claims 24-39 are now in the application. Claims 1-23 have been canceled.

In the first paragraph, the Examiner objected to the specification. The Examiner objected that the specification did not provide support for all of the claimed features, namely, "Computer readable medium." The specification, paragraph [0059] has been amended to provide support for this feature. Support for the change to the specification can be found in the originally-filed application in claim 8.

Claim 24 has been amended by including the feature that the visualization is performed for "a curved layer of a body." This feature is disclosed in paragraph [0021] of the specification. Claim 24 has been further limited by including that the visualization of the second voxels is performed by, "Orthogonal or perspective projection." This is disclosed in paragraph [0030] of the specification.

The other independent claims 35 and 37 have been amended correspondingly.

In addition, claim 34 describes additional features (i.e. the volumetric data having two-dimensional slices). The subject matter of claim 34 is disclosed in the original application in paragraph [0048]. Further reference is made to paragraph [0054] regarding the pre-processing of the volumetric data by reformatting and the step of visualization of the second voxels by generating an image for the voxels within common row positions in parallel slices.

EXHIBIT A is attached to this response. EXHIBIT A is a real-life example of the application of the present invention on volumetric data. EXHIBIT A is provided to illustrate the invention and to help the Examiner to understand the invention.

Subject Matter of Claim 24:

Claim 24 describes a method of volume visualization of a curved layer of a body. The user can select a distance from a reference surface in order to specify the curved layer to be visualized. The curved layer is then visualized by orthogonal or perspective projection of the thus identified voxels of the curved layer.

Due the nature of the orthogonal or perspective projection, a two-dimensional image plane is provided that contains the second voxels, even though the second voxels can be distributed over various slices of the original volumetric data set. Hence, the curved layer of the body that can go through a large number of slices of the original volumetric data set is displayed as a flat surface and can thus be conveniently viewed by showing a single two-dimensional image. This provides an intuitive view that greatly facilitates the work of a radiologist as a pathology is easily noticed.

Reference is made to EXHIBIT A, the attached real life example.

View A of the example shows a radiologic image of a lung. In the example considered here, the surface of the lung is used as the reference surface. The reference surface is shown by the orange line in view A. The reference surface can be determined by means of image segmentation. The green line shown in view A is a user selected distance away from the reference surface. In the example considered here, an orthogonal projection along the x direction that corresponds to the embodiment described in paragraph [0042] of the specification is used to form View B.

View B shows the result when the visualization of the second voxels has been obtained by an orthogonal projection of the second voxels onto the image plane.

Patentability over the Prior Art:

In item 2 of the Office action, the Examiner rejected claims 3, 5, 7-9, 13-14, 18-20, 22-25, and 27-28 as being unpatentable over Gering in view of Payne and Pfister et al. under 35 USC § 103(a).

The new base claim, claim 24, describes a method of visualizing a curved layer of a body that includes the following steps:

providing volumetric data, the volumetric data having first voxels belonging to a reference surface;

determining second voxels of the volumetric data having a user selected distance from the reference surface; and

visualizing the second voxels by orthogonal or perspective projection. (Emphasis added by Applicant.)

The cited prior art shows techniques for distance field manipulation of surface models. Various surface manipulation techniques are discussed, such as surface removal, surface interpolation, surface blending. However, the references do not disclose using a reference surface for determining second voxels of the volumetric data having a user-selected distance from the reference surface and visualizing of the second voxels by orthogonal or perspective projection.

In contrast to the invention, the images provided by the surface manipulation techniques devised in the prior art provide three-dimensional rendering of such surfaces.

The invention as claimed provides a flat, two-dimensional image of a curved layer of a body which in reality goes through various slices of the original volumetric data.

Likewise, Payne and Pfister et al. relate only to volume rendering techniques.

Therefore, the invention according to claim 24 is novel and inventive over the cited prior art because the references suggest volume rendering of surfaces. The references neither teach nor suggest to use a reference surface for identification of second voxels which are then visualized by orthogonal or perspective projection. In fact, the prior art suggests the opposite of the invention as some form of volume rendering is always used for visualization.

Likewise, these arguments apply to the other independent claims: claims 35 and 37.

Claim 34 is patentable for additional reasons. The subject matter of claim 34 relates to the preferred embodiment described with respect to Fig. 3. In essence, the volumetric data is

reformatted by moving the voxels of the reference surface into a common row as shown in Fig. 3 for one of the slices of the volumetric data and by performing the respective move operation for the voxels that are not inside the reference surface while keeping the original distances of these voxels to the reference surface voxels. Due to this reformatting operation the visualization of the second voxels can be performed with virtually no computational effort as it is only required to select voxels from the slices that have common row positions for the visualization.

Hence, the above argumentation regarding patentability applies *a fortiori* with respect to claim 34.

In view of the foregoing, reconsideration and allowance of claims 24-39 are solicited. In the event the Examiner should still find any of the claims to be unpatentable, please telephone counsel so that patentable language can be substituted.

If an extension of time for this paper is required, petition for extension is herewith made.

No fee is believed due. However, please charge any required fee (or credit any overpayments of fees) to the Deposit Account of the undersigned, Account No. 50-0601 (Docket No. 7390-X04-030).

Respectfully submitted,

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